Title: Not Afraid of Patterns

Brief Overview:

During three to four math sessions, students will identify, create, and extend patterns. The motivation for this unit comes from the book, *The Little Old Lady Who Wasn't Afraid of Anything* by Linda Williams. Students will be able create their own pattern and then extend the pattern of another student for at least three terms.

NCTM 2000 Principles for School Mathematics:

- **Equity:** *Excellence in mathematics education requires equity - high expectations and strong support for all students.*
- **Curriculum:** *A curriculum is more than a collection of activities: it must be coherent, focused on important mathematics, and well articulated across the grades.*
- **Teaching:** *Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well.*
- **Learning:** *Students must learn mathematics with understanding, actively building new knowledge from experience and prior knowledge.*
- **Assessment:** *Assessment should support the learning of important mathematics and furnish useful information to both teachers and students.*
- **Technology:** *Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning.*

Links to NCTM 2000 Standards:

- **Content Standards**

Algebra

- *Understand patterns, relationships, and functions.*
- *Analyze change in various contexts.*

Geometry

- *Use visualization, spatial reasoning, and geometric modeling to solve problems.*

- **Process Standards**

Problem Solving

- *Build new mathematical knowledge through problem solving.*
- *Solve problems that arise in other contexts.*
- *Apply and adapt a variety of appropriate strategies to solve problems.*
- *Monitor and reflect on the process of mathematical problem solving.*

Reasoning and Proof

- *Recognize reasoning and proof as fundamental aspects of mathematics.*
- *Develop and investigate mathematical conjectures.*
- *Select and use various types of reasoning and methods of proof.*

Communication

- *Organize and consolidate their mathematical thinking through communication.*
- *Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.*
- *Analyze and evaluate their mathematical thinking and strategies of others.*
- *Use the language of mathematics to express mathematical ideas precisely.*

Connections

- *Recognize and use connections among mathematical ideas.*
- *Recognize and apply mathematics in contexts outside of mathematics.*

Representation

- *Create and use representations to organize, record, and communicate mathematical ideas.*
- *Select, apply, and translate among mathematical representations to solve problems.*
- *Use representations to model and interpret physical, social, and mathematical phenomena.*

Links to National Science Education Standards:

- **Unifying Concepts and Processes**
  Students will understand systems, order, and organization.

- **Life Science**
  Students will understand life cycles of organisms.

Grade/Level:

Grades 2/3

Duration/Length:

Three – four days/45 minutes a day. The unit will vary depending on class individualities. Lesson should be introduced in the Fall of the school year.

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Basic shape recognition
- Understanding of repeating patterns

Student Outcomes:

Students will be able to:

- identify patterns.
- continue patterns.
- describe a pattern.
- create a pattern.
- work cooperatively in groups.

Materials/Resources/Printed Materials:

- Book *The Little Old Lady Who Wasn't Afraid of Anything* (ISBN: 0064431835)
- Unifix cubes for each student (at least three colors per student)
- Teacher Resource Sheets #1-5
- Student Resource Sheets #1-3
- Crayons
- Bulletin board paper
- Blank sentence strips
- Pattern stickers, stamps, or other materials

Development/Procedures:

Day One

- Read *The Little Old Lady Who Wasn't Afraid of Anything* as a motivational activity to begin patterning. Teacher will use movement to enhance the pattern sequence in the book. Students will begin to mimic the teacher's movement as they realize the pattern.
- Ask, "What do you notice about this story?" Discuss student responses. Teacher will listen for the word "**pattern**" in the discussion.
- Display "Math Talk" chart. The Math Talk Chart is a sheet of bulletin board paper with the words "Math Talk" written at the top. The teacher records math vocabulary throughout the unit. Generate vocabulary terms on the chart from class discussion.

- Model another movement pattern using **Teacher Resource Sheet #2** on the overhead. Encourage the students to continue each pattern. Continue activity by varying the patterns. Students will continue each pattern displayed.
- Distribute **Student Resource Sheet #1**. Give the students two copies of the sheet. Two copies will ensure the repetition of the pattern. Students will cut out the icons and form their own patterns at their desks. When finished, students will move to another desk to complete their neighbor's pattern.
- Students will record in their math journals what they have learned about patterns.

Day Two

- Begin lesson by having a few students share math journal reflections as a review from yesterday's lesson.
- Ask the children what pattern was repeated in the story. (clomp, clomp, clap)
- Ask the children to model a similar pattern with body movements.
- Ask, "Could we make a pattern with unifix cubes?" Model responses for children with the unifix cubes.
- Distribute the **Student Resource Sheet #2.** Have children copy the teacher's model with unifix cubes. Student then records the pattern by coloring the grids. Students should leave every other row blank when beginning a new pattern. This row will be used later.
- Introduce the vocabulary: **core** and **term (Teacher Resource Sheet #1)**
- Show new core patterns at least three times and then the next term. Have students complete the pattern using unifix cubes, then record their patterns on their grids. This recording should be done on row three of the grid.
- Teacher will monitor as these are recorded. When all are completed, discuss the pattern.
- Students will then create their own pattern using unifix cubes. They will record their pattern on row five of the grid. Teacher will "clipboard cruise" **(Teacher Resource Sheet #3)** monitoring students' patterns and use scoring tool.**(Teacher Resource Sheet #4)**

Day Three

- Students will create a "Gallery Wall" bulletin board to display patterns made from the previous day. Categorize "like" patterns as they are displayed on the wall. Compare and contrast these patterns.
- After patterns have all been displayed, ask students which patterns would display a "snap, snap, clap" pattern? Listen to responses and monitor. Encourage students to critique answers. Continue questioning activity using different patterns, ex. "snap, snap, clap, clap", "snap, clap, snap, clap" about the different patterns displayed on the "Gallery Wall."
- Label each category of patterns on the wall after discussion of how they are like. Use the grid strips to highlight the different categories showing "snap, snap, clap" etc. patterns.
- After the grid strips are displayed, ask the children "How else could we say "snap, snap, clap" (or other patterns)?" The children should respond using the basic pattern sequences found on **Teacher Resource Sheet #1.** An example of the gallery wall will be displayed

on **Teacher Resource Sheet #5.**

Performance Assessment:

Day Four
Read the vignette, **Student Resource Sheet #3,** with the students. Discuss the student expectations and the scoring tool. The teacher will provide stickers/stamps, sentence strips, and clean lined paper for student use.

Extension/Follow Up:

- Read aloud the book, *The Pumpkin Book* by Gail Gibbons (ISBN O-8234-1465-5).
- While working on this unit discuss patterns involving smallest to largest using pattern blocks.
- Discuss life cycles of plants, animals, and humans.
- Students familiar with skip counting by twos may complete the following activity **Student Extension Sheet #1.** Answers for this activity are provided on **Teacher Extension Sheets #1 and #2.**

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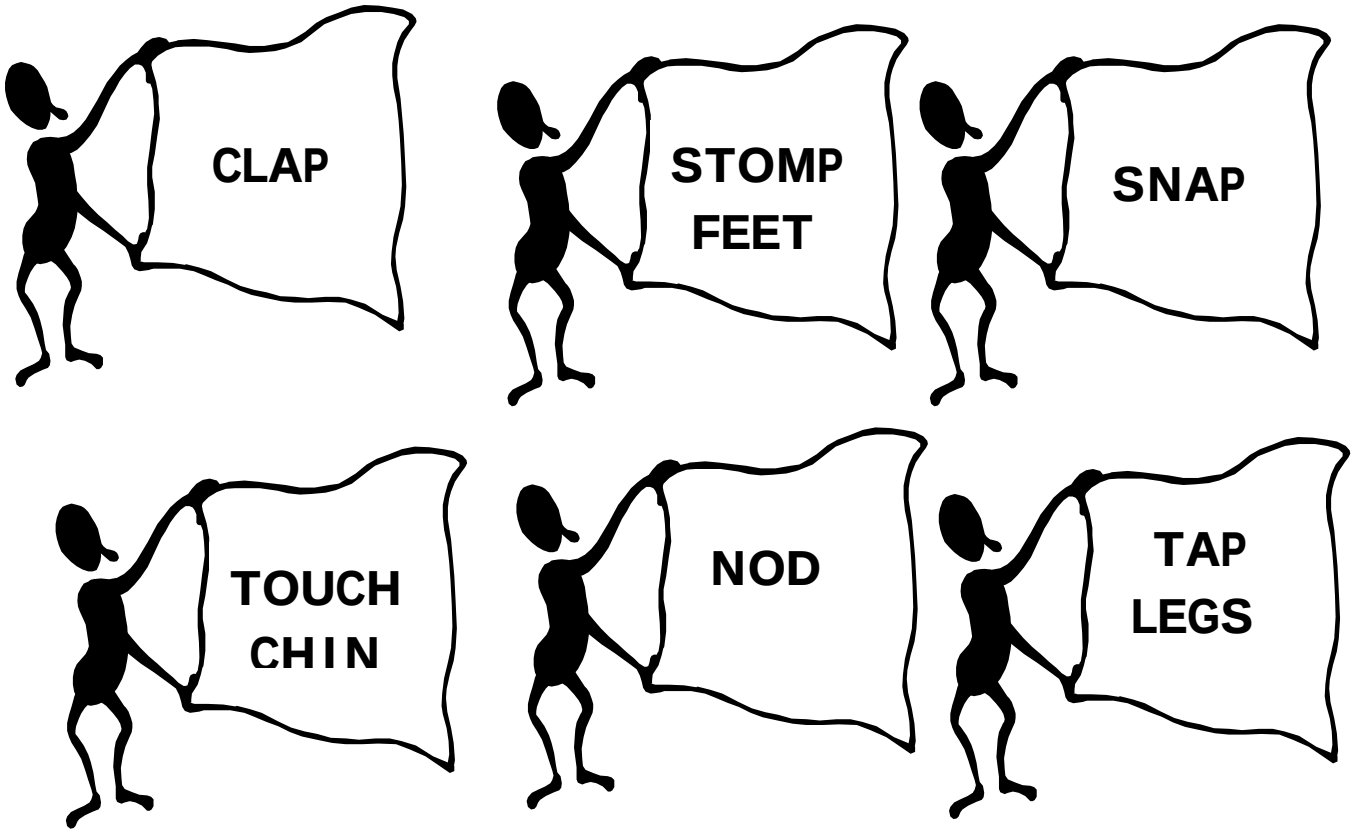
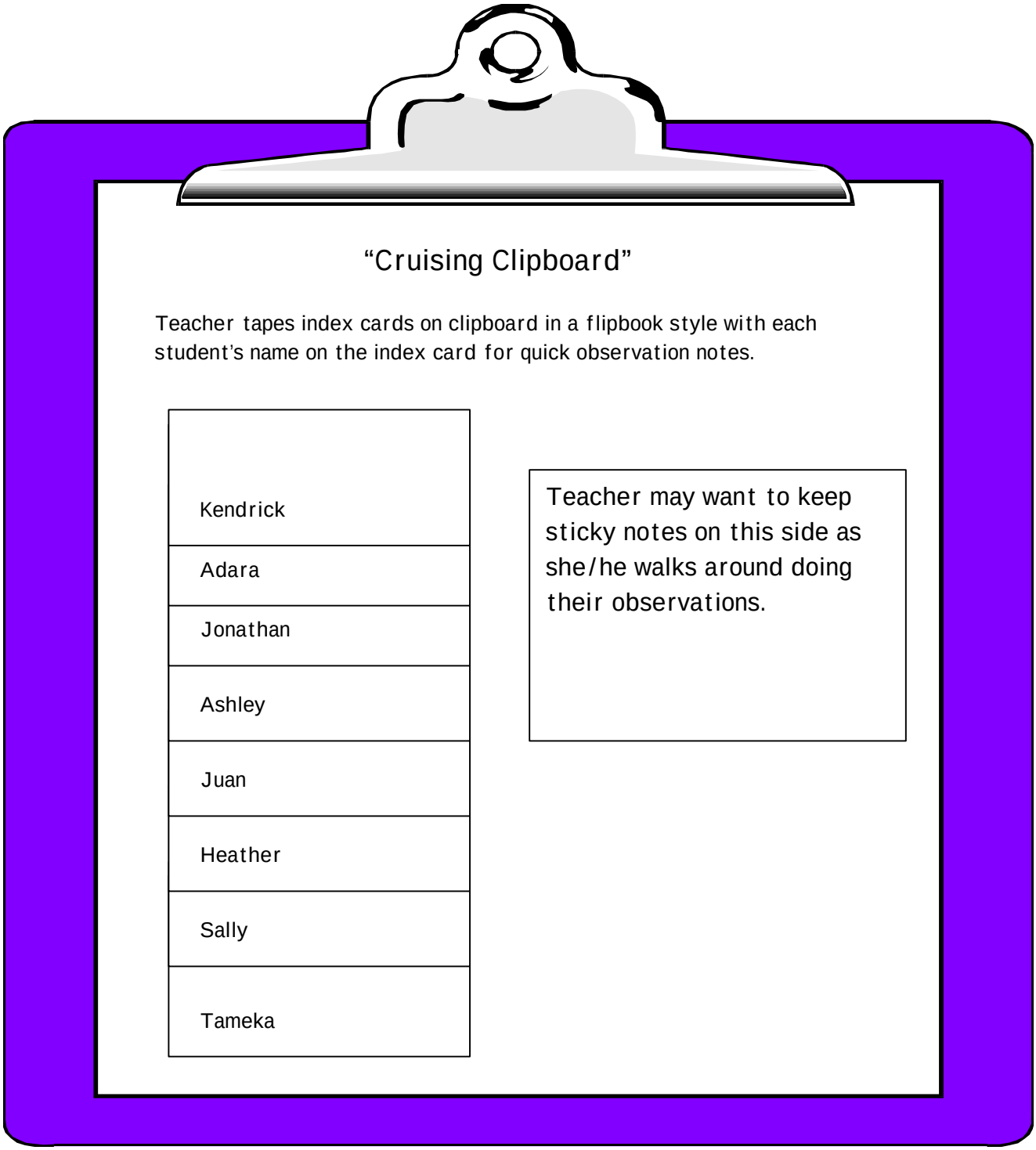

CLAP
STOMP FEET
SNAP
TOUCH CHIN
NOD
TAP LEGS

Teaching Technique for Ongoing Assessment



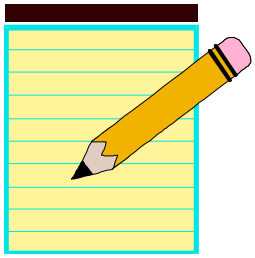
"Cruising Clipboard"

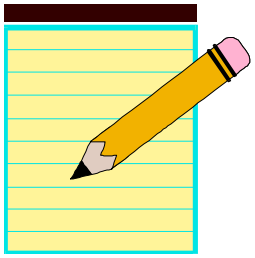
Teacher tapes index cards on clipboard in a flipbook style with each student's name on the index card for quick observation notes.

Kendrick
Adara
Jonathan
Ashley
Juan
Heather
Sally
Tameka

Teacher may want to keep sticky notes on this side as she/he walks around doing their observations.

Scoring Key For Patterns





3 –Pattern contains a core that is repeated at least three times.

2 – Pattern contains a core that is not repeated three times.

1 – No pattern is visible.

Gallery Wall

Snap, Clap	**Snap, Snap, Clap**	**Snap, Clap, Stomp**
Student Work		
AB Pattern	**AAB Pattern**	**ABC Pattern**

- **This is how student work should be displayed on the bulletin board.**
- **The students can use the board to compare and contrast their patterns.**

Vocabulary

Pattern – A pattern is a sequence of objects, numbers, color, etc. that repeats.

Sequence – a set of objects or numbers arranged in a special order or pattern.

Core – The core is the smallest part of the pattern that is repeated. The core should be repeated at least three times.

Term- A term is each place or position in the sequence.

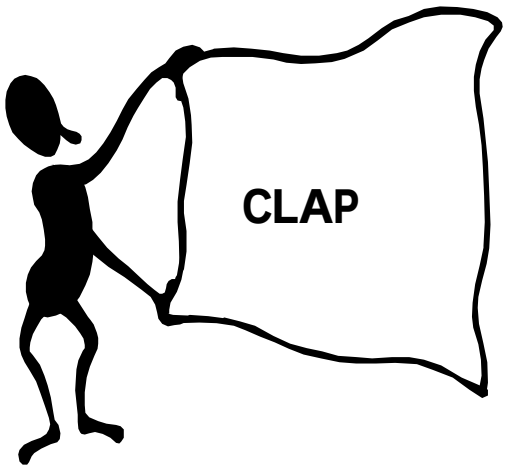
Function – A set of ordered pairs such that for any first number (the input), there is only one possible second number (the output).

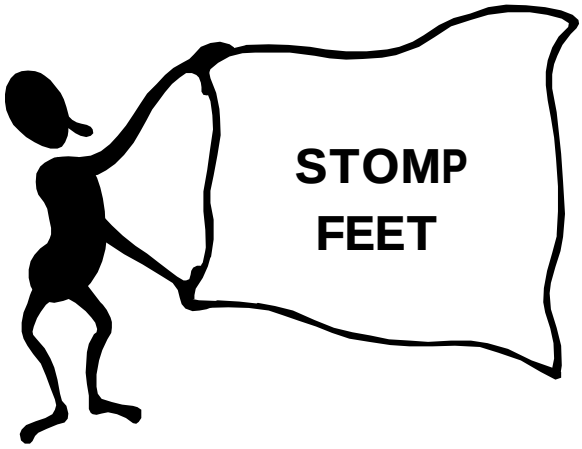
Basic Pattern Sequences

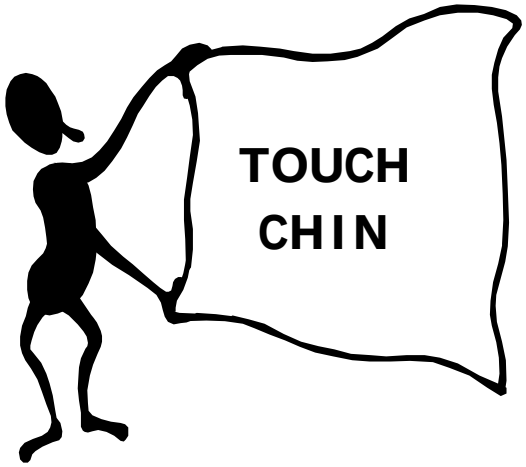
AB, AB,AB,AB,…

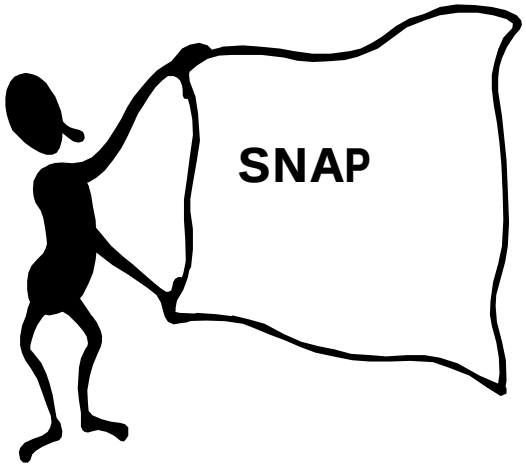
AAB, AAB, AAB, AAB, …

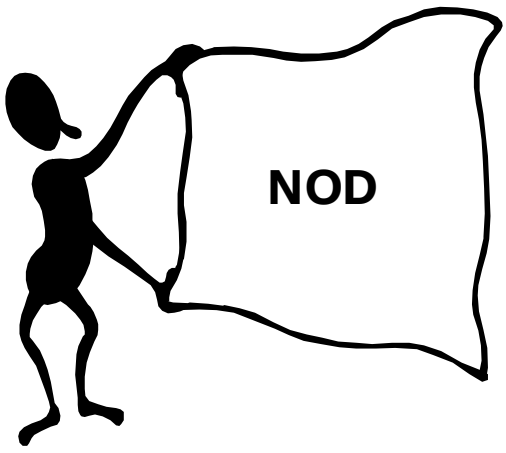
ABC, ABC, ABC, ABC, …

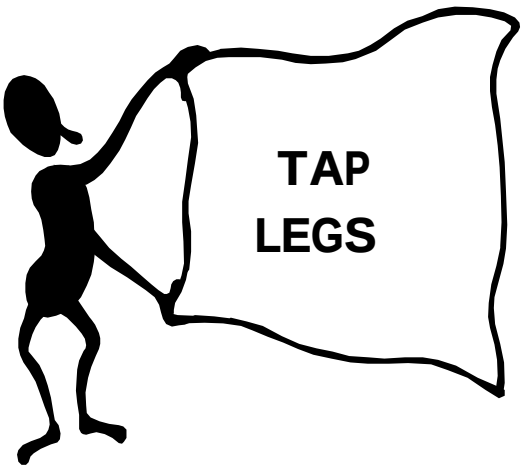

CLAP


STOMP
FEET


TOUCH
CHIN


SNAP


NOD


TAP
LEGS

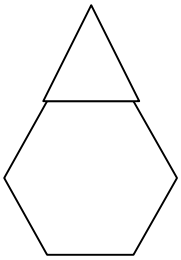
Row 1										
Row 2										
Row 3										
Row 4										
Row 5										
Row 6										
Row 7										
Row 8										

Student Resource Sheet #3

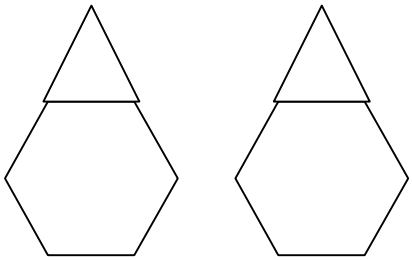
The next day the little old lady took her granddaughter to walk on the same path. While they were walking, they decided to gather items along the path to remember their autumn walk. As they were walking, they gathered acorns, different colored leaves, stones, and pinecones.

What patterns could be made using some of the items they gathered on their walk? Construct a pattern using a sentence strip by drawing, writing or using stickers/stamps. On a clean sheet of paper, tell why this group of items is a pattern. Describe your new pattern and show this pattern in two other ways.

Pumpkin Patterns



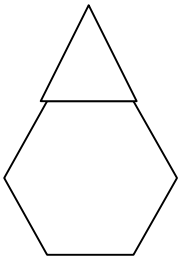
It takes 2 blocks to make one pumpkin.



It takes 4 blocks to make two pumpkins.

How many blocks would it take to make 3 pumpkins? 6 pumpkins? 12 pumpkins?

Pumpkin Patterns



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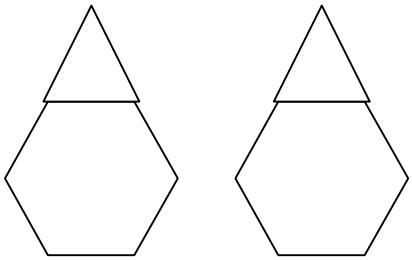

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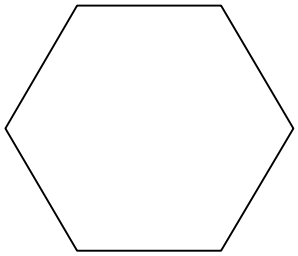
Answer Key

Pumpkins	Blocks
1	2
2	4
3	6
4	8
5	10
6	12
7	14
8	16
9	18
10	20
11	22
12	24

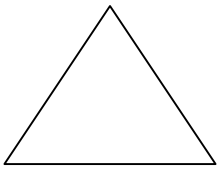
Rule: Number of pumpkins x 2 = Number of blocks needed

Pattern Blocks Template

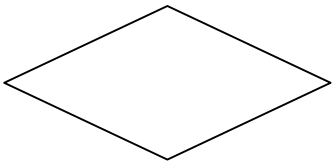
Square



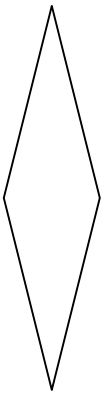
Hexagon



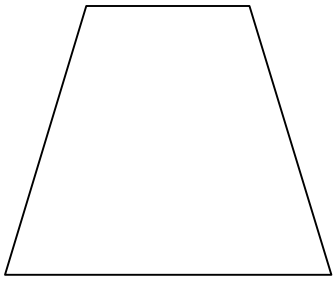
Triangle



Rhombus



Parallelogram



Trapezoid